

REMARKS

Reconsideration and allowance of this application are respectfully requested. Claims 5-8 have been editorially amended. New claims 35-48 have been added. Claims 1-48 are now pending in the application. The rejections are respectfully submitted to be obviated in view of the remarks presented herein.

As a preliminary matter, the paragraphs beginning on page 8, line 26 and page 24, line 16 in the specification have been amended to correct a typographical error in the equations.

Rejection Under 35 U.S.C. § 103(a) - Suzuki in view of Takayama et al.

Claims 1-4 and 20-23 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of Suzuki (U.S. Patent Number 5,327,246) and Takayama et al. (U.S. Patent Number 6,683,643 B1) (hereinafter "Takayama"). The rejection is respectfully traversed.

Regarding claim 1, Applicants' claimed invention relates to an apparatus comprising an image data storing means which stores digital image data obtained by photoelectrically detecting light, and an abnormal pixel determining means which defines subject pixels as abnormal pixels when a difference between the density signal level of the subject pixel and the density signal levels of pixels adjacent to the subject pixel is greater than a predetermined level.

Turning to the cited art, Suzuki discloses a circuit for removing a pixel defect from a pixel group of a received video signal. A pixel value of a pixel of notice is delivered along with a group of proximal pixel values consisting of pixels values of proximal pixels adjacent two-dimensionally around the pixel of notice. A maximum pixel value Y_{max} of the group and a

minimum pixel value Y_{min} of the group are also delivered. A difference DIF_{max} between the pixel value of the pixel of notice and Y_{max} is compared with a threshold TH_{max} , and a signal SEL_{max} is made active if $DIF_{max} > TH_{max}$. Additionally, a difference DIF_{min} between the pixel value of the pixel of notice and Y_{min} is compared with another threshold TH_{min} , and a signal SEL_{min} is made active if $DIF_{min} > TH_{min}$ (column 4, lines 44-61). When SEL_{max} and SEL_{min} are both inactive, the pixel value of the pixel of notice is taken as its own value. When SEL_{max} is active and SEL_{min} is inactive, the pixel value of the pixel of notice is given as Y_{max} . When SEL_{max} is inactive and SEL_{min} is active, the pixel value of the pixel of notice is given as Y_{min} (column 5, lines 13-25).

Examiner maintains that the combination of Suzuki and Takayama teaches each feature of independent claim 1. However, Examiner readily admits that Suzuki does not disclose an image data storing means for storing digital image data obtained by photoelectrically detecting light with a CCD to produce analog image data and digitizing the analog pixel data. Additionally, Suzuki does not define the subject pixel as an abnormal pixel when the difference between the density signal level of the subject pixel and the density signal levels of pixels adjacent to the subject pixel is greater than a predetermined level. Suzuki does not compare the difference between the pixel value of the pixel of notice and pixel values of the proximal pixel value group, to a predetermined level. Instead, Suzuki has two threshold levels, one threshold to compare with a difference between the pixel value of the pixel of notice and a maximum value from the group, and the other threshold to compare with a difference between the pixel value of the pixel of notice and a minimum value from the group. By comparing the pixel value of the

pixel of notice separately to the maximum and minimum values from the group, Suzuki does not take into account the density signal levels of pixels adjacent to the subject pixel, but rather only considers two outlier values from among the group of pixels. Additionally, Suzuki's thresholds THmax and THmin together do not constitute Applicants' predetermined level, but instead are used to generate two separate difference determinations from the pixel value of the pixel of notice with the two outlier values only. The determination of pixel value differences DIFmax and DIFmin being larger than predetermined thresholds THmax and THmin, respectively, do not define an abnormal pixel with the characteristic of the difference being greater than a predetermined number, as claimed.

Takayama does not remedy the deficiencies of Suzuki. Takayama teaches a defective pixel detection in photography using a CCD. Image data of each pixel of a solid image pickup element obtained through image pickup is compared with reference image data to detect defect pixels in the solid image pickup element. However, the comparison of image data of each pixel is made to a reference or threshold value which does not relate to density signal levels of pixels adjacent to the subject pixel. Furthermore, Applicants' abnormal pixel determining means in the image processing apparatus defines the subject pixel as abnormal when the difference between the subject pixel and the density signal levels of pixels adjacent to the subject pixel is greater than a predetermined number. At least by virtue of the aforementioned differences, the invention defined by Applicants' claim 1 is patentable over Suzuki in view of Takayama. Applicants' claims 2-4 and 20-23 are dependent claims including all of the limitations of independent claim 1, which, as established above, patentably distinguishes over Suzuki in view of Takayama.

With further regard to claims 3 and 4, the abnormal pixel determining means is constituted to determine whether the density signal level of each subject pixel is higher than a maximum value of the density signal levels of the pixels adjacent to the subject pixel and whether or not the density signal level of the subject pixel is lower than a minimum value of the density signal levels of the pixels adjacent to the subject pixel only. If either of these determinations are true, a judgment is then made as to whether or not the difference between the density signal level of the subject pixel and the density signal levels of pixels adjacent to the subject pixel is greater than the predetermined level. Since Suzuki obtains a difference between the pixel value of the pixel of notice and a maximum value from the group, and a difference between the pixel value of the pixel of notice and a minimum value from the group, and compares each difference to respective thresholds, the references lack the characteristics as described by claims 3 and 4. Applicants' abnormal pixel determining means compares the difference between density signal level of the subject pixel and the density signal levels of adjacent pixels only when the subject pixel is either higher than the maximum value or lower than the minimum value.

Rejection Under 35 U.S.C. § 103(a) - Suzuki in view of Takayama et al. further in view of Kilgore

Claims 13-15 and 28-30 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of Suzuki and Takayama further in view of Kilgore (U.S. Patent Number 5,903,659). The rejection is respectfully traversed.

Regarding claims 13-15, Examiner readily admits that Suzuki and Takayama do not disclose that the average value of the density signal levels of the pixels adjacent to the subject pixel excludes the pixels whose density levels have the maximum value and the minimum value. Additionally, Suzuki and Takayama do not define the subject pixel as an abnormal pixel when the difference between the density signal level of the subject pixel and the density signal levels of pixels adjacent to the subject pixel is greater than a predetermined level, as discussed above.

Kilgore does not remedy the deficiencies of Suzuki and Takayama. Kilgore teaches a method for fixing pattern noise errors. The sum of neighboring pixels is “Alpha-Trimmed” by subtracting the minimum and maximum pixel values before a mean value is calculated (column 5, lines 32-59). The mean value is then used to measure how a pixel differs from its neighboring pixels. However, Kilgore also does not teach an abnormal pixel determining means in the image processing apparatus defining the subject pixel as abnormal when the difference between the subject pixel and the density signal levels of pixels adjacent to the subject pixel is greater than a predetermined number. At least by virtue of the aforementioned differences, the invention defined by Applicants’ claims 13-15 are patentable over Suzuki and Takayama further in view of Kilgore. Applicants’ claims 28-30 are dependent from claims 13-15, respectively, which, as established above, patentably distinguishes over Suzuki and Takayama further in view of Kilgore. Therefore, claims 28-30 are patentable over Suzuki and Takayama further in view of Kilgore by virtue of the aforementioned differences as well as for their additionally recited features.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/639,992
Attorney Docket No. Q60457

Newly Added Claims

Claims 35-48 are newly added by this Amendment and are believed to be in condition for allowance.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.


Respectfully submitted,

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